Spectrum and Propagation Measurements

The radio spectrum is a natural resource that offers immense benefit to industry, private citizens, and government by supporting a wide range of radio and wireless applications for communications and sensing. Unlike many other natural resources, the spectrum is non-depleting so it can be used indefinitely. However, active competition for access to the radio spectrum suggests that its shared use will require increasingly more complex planning and coordination tools to ensure its effective use while avoiding increased levels of interference.

Efficient and effective use of the spectrum is a key element in both the NTIA and the ITS mission. NTIA manages the Federal Government's use of the spectrum to ensure maximum benefit to all users while accommodating additional users and new services.

The Spectrum and Propagation Measurements Division of ITS performs measurements of radio signals to support research and engineering promoting more efficient and effective use of today's spectrum, while opening up more spectrum in the future at ever-higher frequencies. The following areas of emphasis are indicative of the work done recently in this Division to support NTIA, industry, and other Federal agencies.

Areas of Emphasis

Radio Spectrum Measurement System Upgrades The Institute uses its Radio Spectrum Measurement System (RSMS) to make spectrum occupancy measurements, and to help assess interference and compatibility issues. The Institute received funding for a major RSMS system upgrade in FY 2002. Details of the RSMS-4 design and development are described in the following separate sections on vehicle, measurement equipment, and software. The project is funded by NTIA.

RSMS-4 Design and Development — Vehicle A new vehicle for the RSMS-4 will provide multiple work spaces for researchers and up to 3 independent measurement systems, along with multiple antenna towers and a controlled environment.

RSMS-4 Design and Development — RF and Measurement Hardware The RSMS-4 measurement hardware will provide multiple measurement systems having improved sensitivity, bandwidth, and dynamic range. In addition to built-in measurement functions, the system supports powerful digital signal processing capabilities.

RSMS-4 Design and Development — Software The measurement and analysis capabilities of the RSMS-4 will be controlled by a greatly-enhanced set of software that will allow weeks of unattended measurements, flexible field modification of system hardware configuration and control software, remote control and monitoring of field operations, and very powerful digital signal processing capabilities.

Spectrum Compatibility Measurements The Institute participates in measurements of the emission characteristics of new or proposed systems to help determine their compatibility with each other and with existing systems. The project is funded by NTIA.

Spectral Assessment of Government Systems The Institute performs measurements on new and established Federal systems to determine their emissions characteristics, to confirm proper operation, or to identify and mitigate interference or other incompatibilities. Projects are funded by NTIA.

UWB Regulatory Activities The Institute has completed measurements to characterize ultrawideband (UWB) devices and interference to conventional radio systems. Current work includes tutorial and advisory help to spectrum regulators and to laboratories attempting initial UWB device measurements. The project is funded by NTIA.